

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application No. 10/657,894

Confirmation No. 2642

Applicant: ANDRIESSEN

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Examiner: Barton Jeffrey Thomas

Docket No.: 224088 (Client Reference No. SPGN 02097 OCONSOLAR-1 #GU)

Customer No.: 23460

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REPLY TO OFFICE ACTION

Sir:

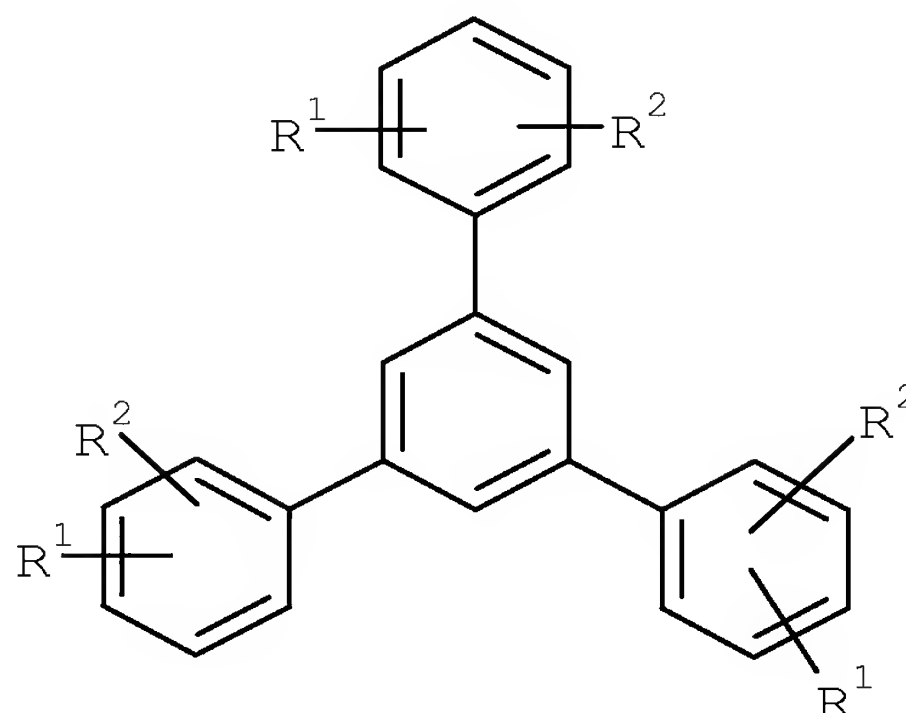
In reply to the Office Action dated July 3, 2007, please enter the following amendments and consider the following remarks.

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks begin on page 11 of this paper.

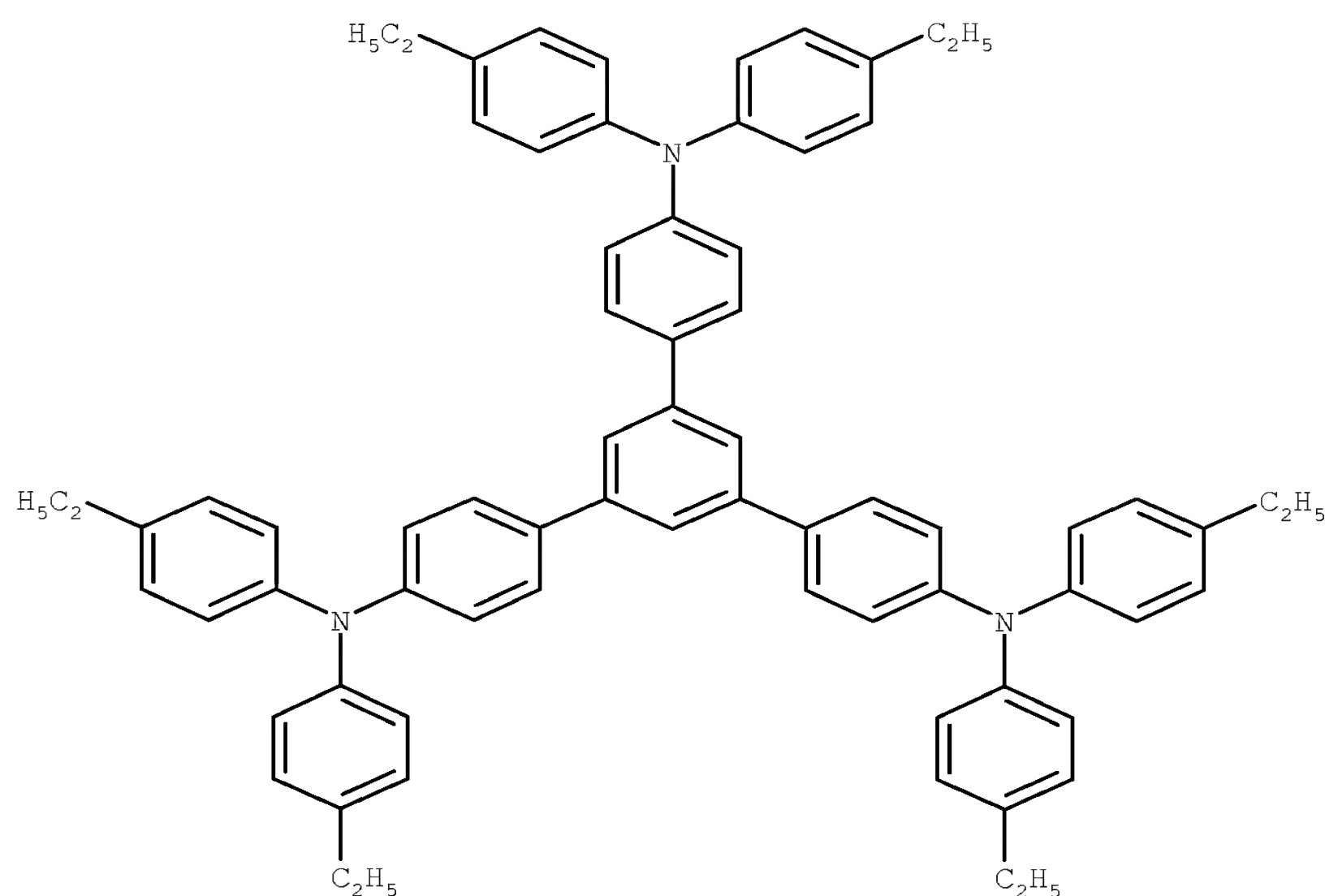
AMENDMENTS TO THE CLAIMS

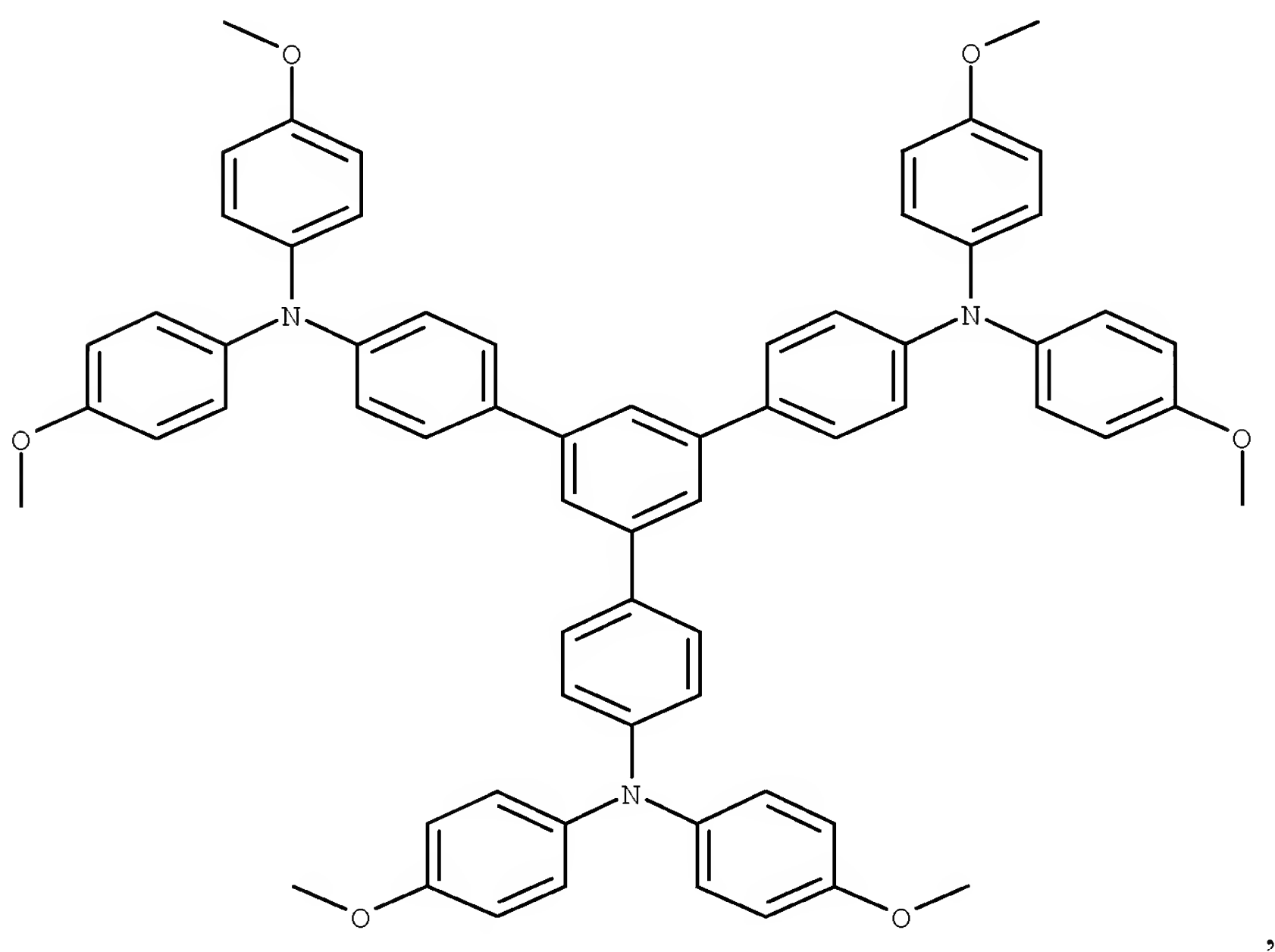
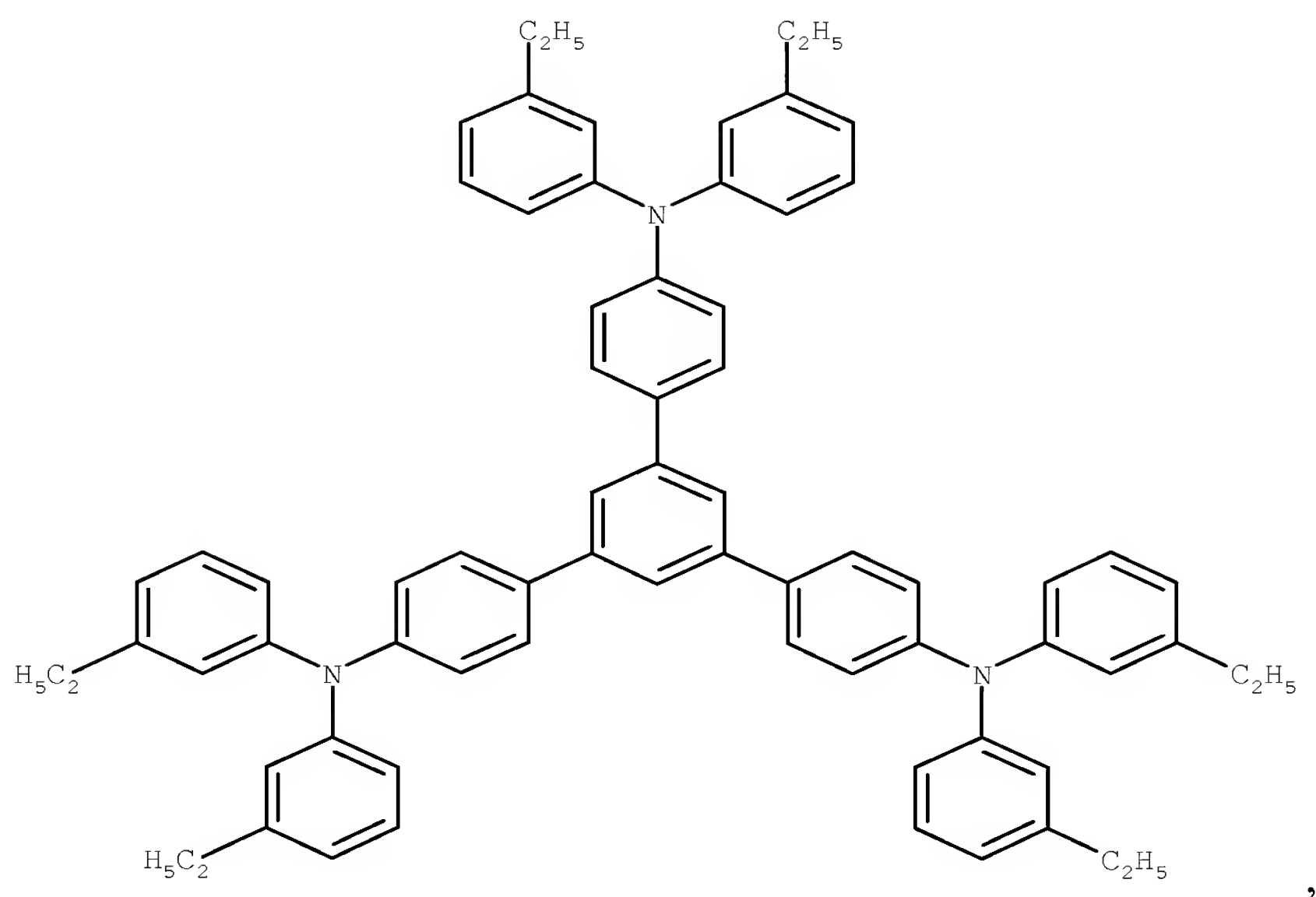
1. (Currently Amended) A photovoltaic device comprising a n-type semiconductor with a band-gap of greater than 2.9 eV and a 1,3,5-tris-aminophenyl-benzene compound represented by formula (I):

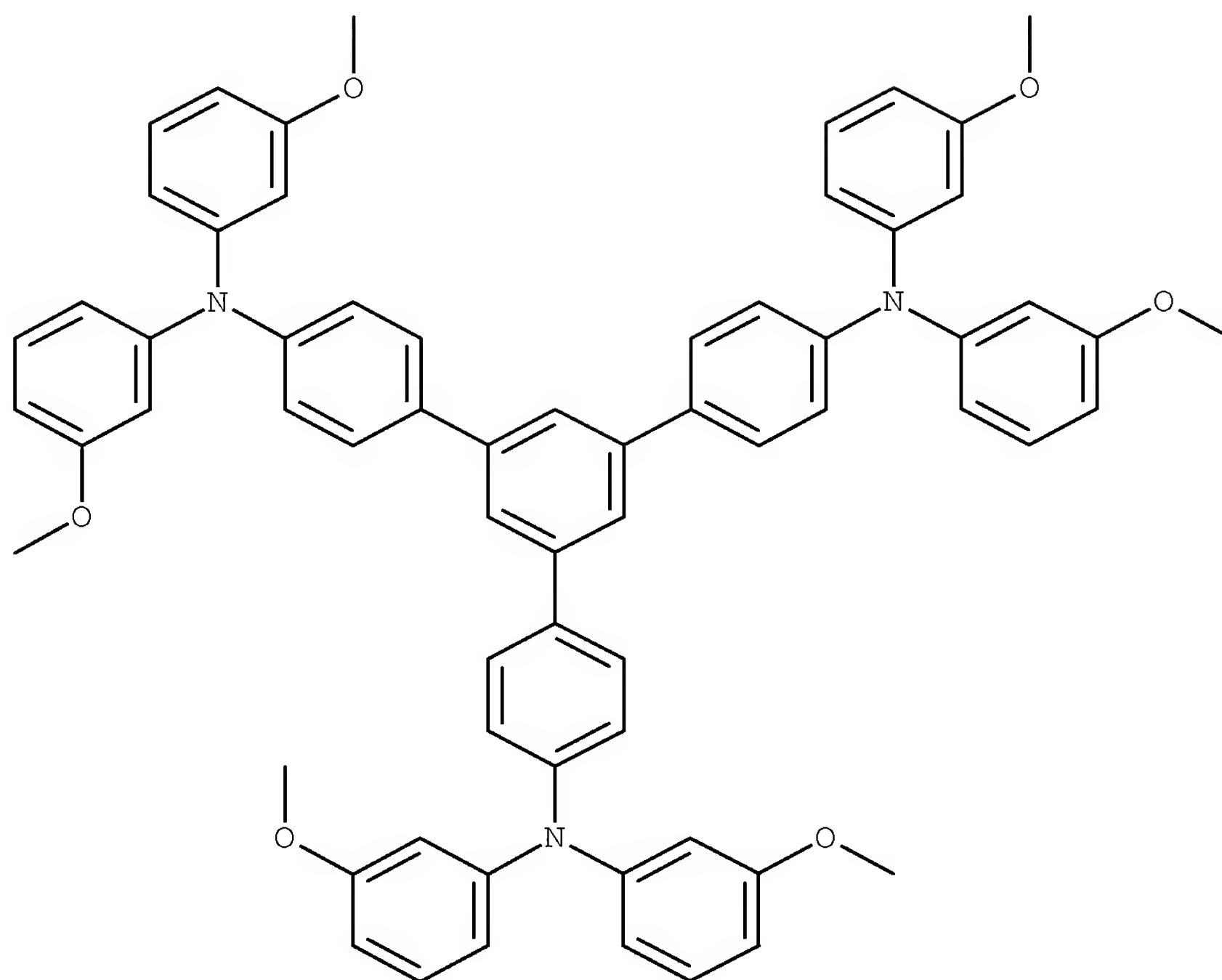


wherein R^1 represents a $-NR^3R^4$ group, wherein R^3 and R^4 , same or different, represent an unsubstituted C_2 - C_{10} alkyl group, a substituted C_2 - C_{10} alkyl group, a benzyl group, an unsubstituted cycloalkyl group, a substituted cycloalkyl group, an unsubstituted aryl group or a substituted aryl group, and R^2 represents hydrogen, an alkyl group including a substituted alkyl group or halogen; and said 1,3,5-tris-aminophenyl-benzene compound is in a stable cationic form.

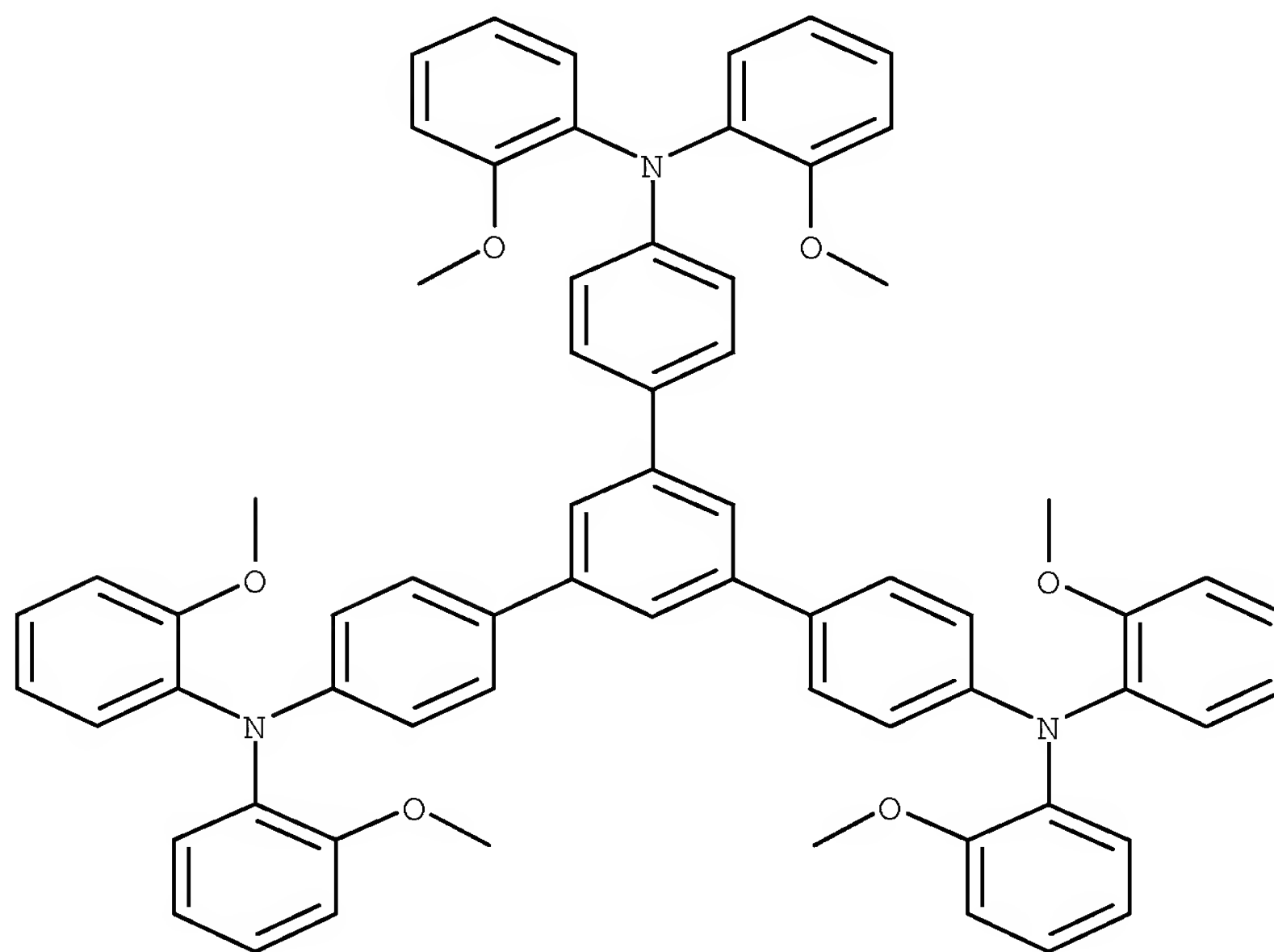
2. (Currently Amended) Photovoltaic device according to claim 1, wherein said 1,3,5-tris-aminophenyl-benzene compound represented by formula (I) is selected from the group consisting of the stable cations of:





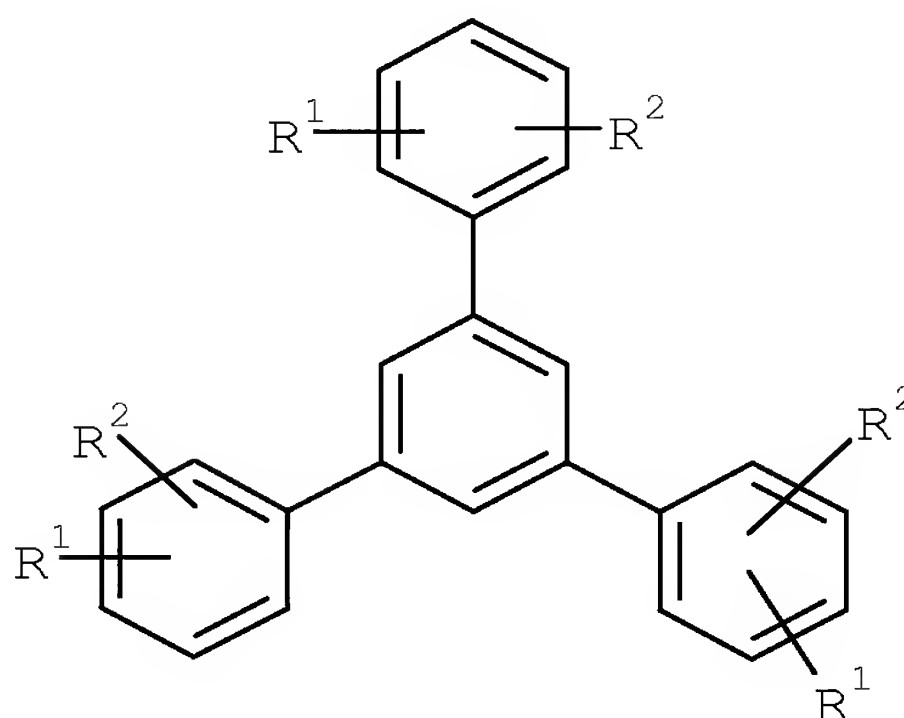


and



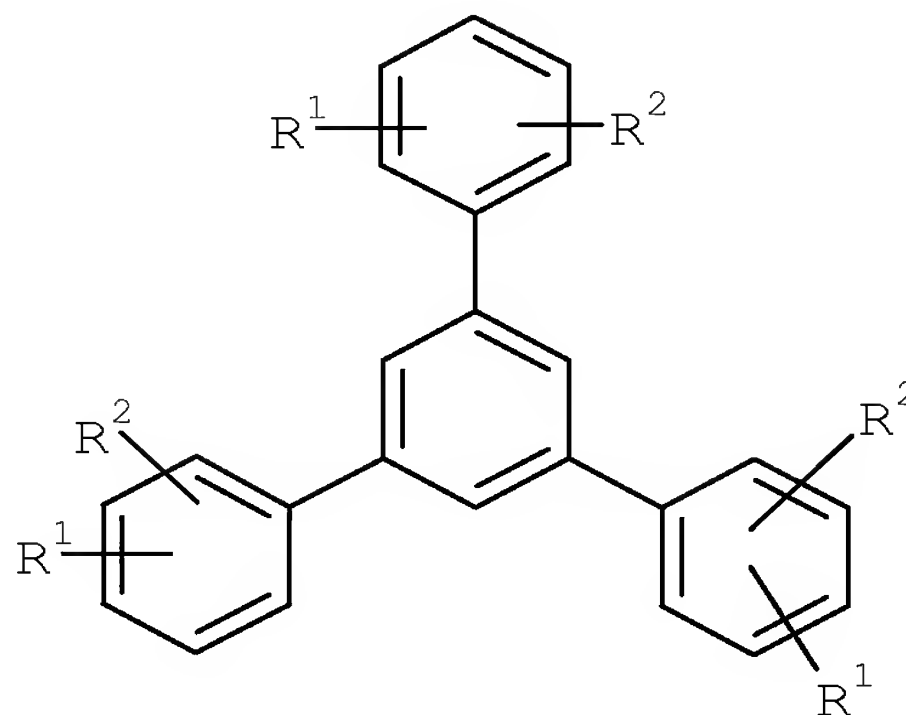
3. (Original) Photovoltaic device according to claim 1, wherein said n-type semiconductor is selected from the group consisting of titanium oxides, tin oxides, niobium oxides, tantalum oxides, tungsten oxides and zinc oxides.

4. (Original) Photovoltaic device according to claim 1, wherein said photovoltaic device further contains at least one spectral sensitizer.
5. (Original) Photovoltaic device according to claim 1, wherein said photovoltaic device further contains at least one spectral sensitizer selected from the group consisting of metal chalcogenide nano-particles with a band-gap of less than 2.9 eV, organic dyes and metallo-organic dyes.
6. (Original) Photovoltaic device according to claim 1, wherein said photovoltaic device further contains at least one spectral sensitizer selected from the group consisting metal oxides, metal sulphides and metal selenides.
7. (Currently Amended) A process for preparing a photovoltaic device comprising a n-type semiconductor with a band-gap of greater than 2.9 eV and a 1,3,5-tris-aminophenyl-benzene compound represented by formula (I):



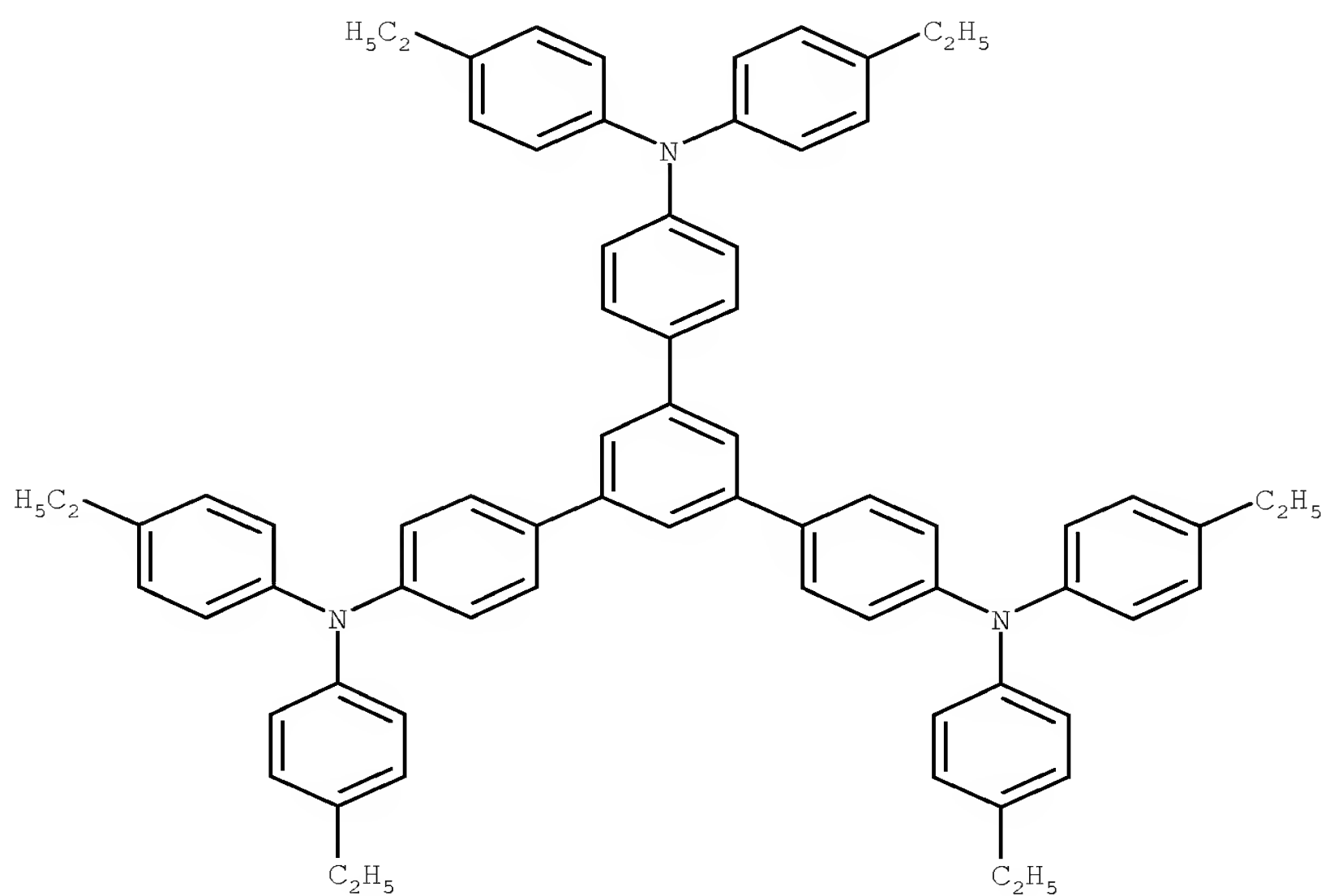
wherein R^1 represents a $-NR^3R^4$ group, wherein R^3 and R^4 , same or different, represent an unsubstituted C_2-C_{10} alkyl group, a substituted C_2-C_{10} alkyl group, a benzyl group, an unsubstituted cycloalkyl group, a substituted cycloalkyl group, an unsubstituted aryl group or a substituted aryl group, and R^2 represents hydrogen, an alkyl group including a substituted alkyl group or halogen, and said 1,3,5-tris-aminophenyl-benzene compound is in a stable cationic form, with at least one transparent electrode comprising the steps of: providing a support with a conductive layer as one electrode; coating said conductive layer on the support with a layer comprising said n-type semiconductor with a bandgap of greater than 2.9 eV; coating said n-type semiconductor-containing layer with a solution or dispersion comprising a cation of said 1,3,5-tris-aminophenyl-benzene compound to provide after drying a layer comprising said 1,3,5-tris-aminophenyl-benzene compound; and applying a conductive layer to said layer comprising said 1,3,5-tris-aminophenyl-benzene compound thereby providing a second electrode.

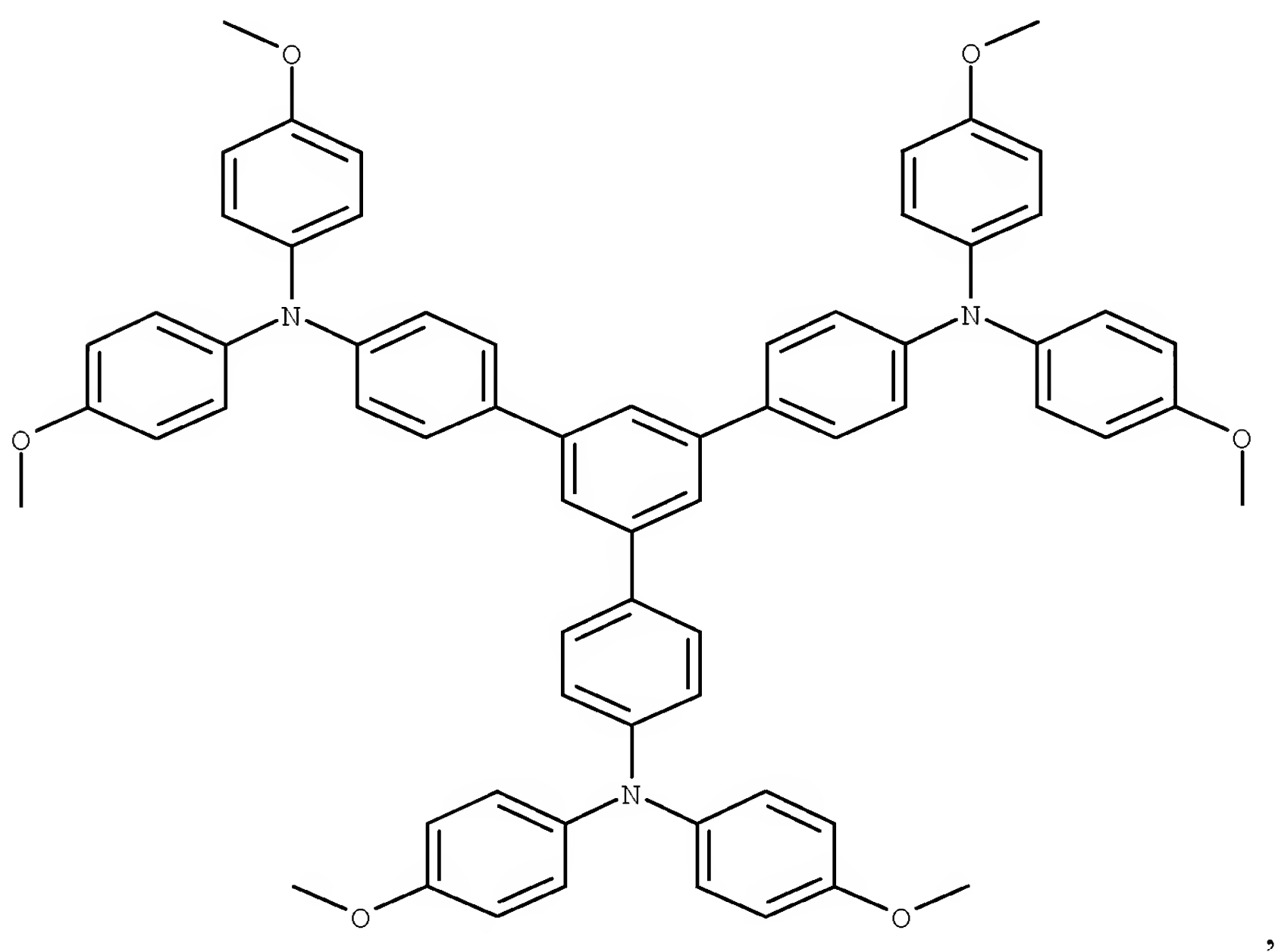
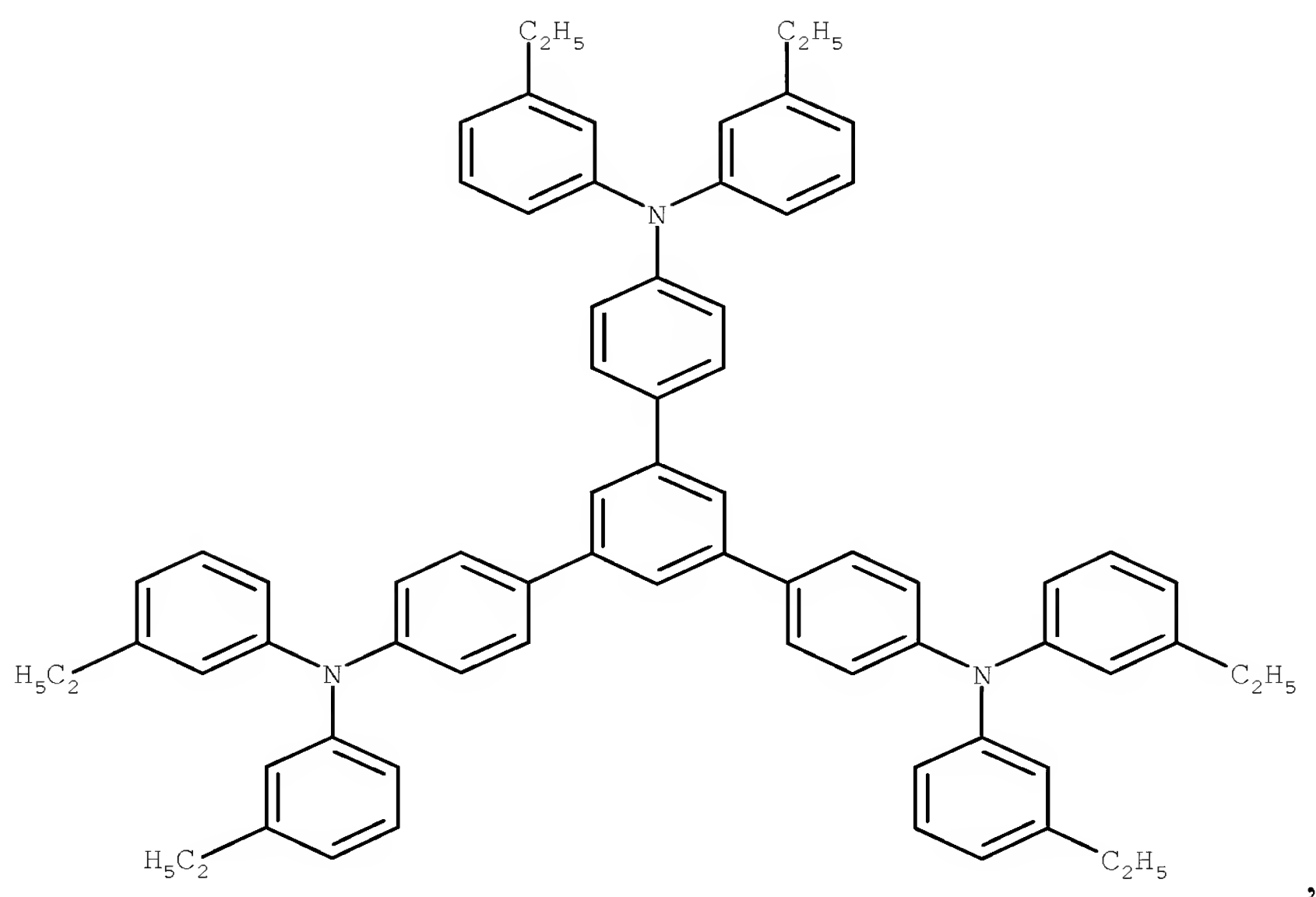
8. (Original) A photovoltaic device comprising a n-type semiconductor with a band-gap of greater than 2.9 eV and a 1,3,5-tris-aminophenyl-benzene compound represented by formula (I):

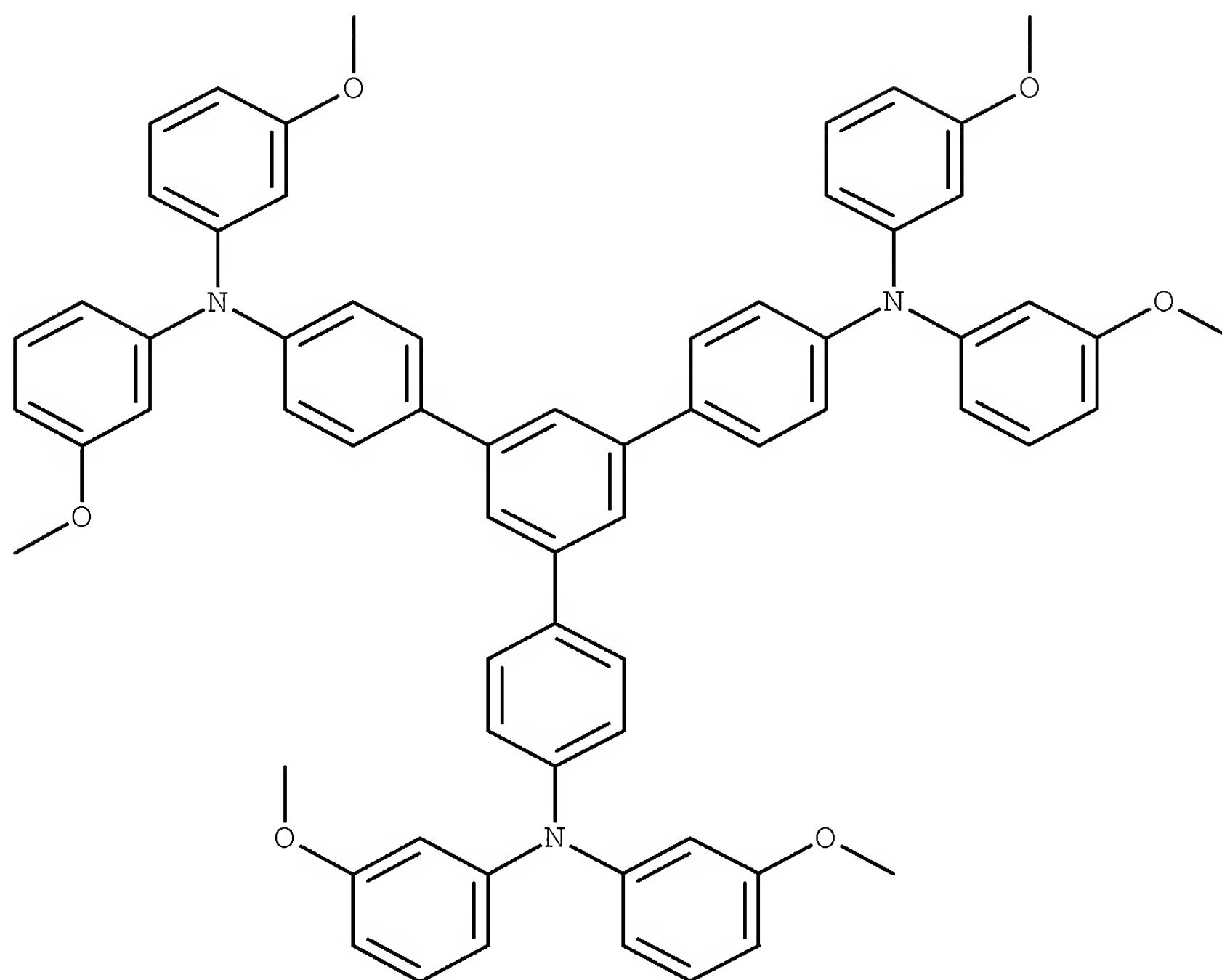


wherein R^1 represents a $-NR^3R^4$ group, wherein R^3 and R^4 , same or different, represent an unsubstituted C_2-C_{10} alkyl group, a substituted C_2-C_{10} alkyl group, a benzyl group, an unsubstituted cycloalkyl group, a substituted cycloalkyl group, an unsubstituted aryl group or a substituted aryl group, and R^2 represents hydrogen, an alkyl group including a substituted alkyl group or halogen; and said 1,3,5-tris-aminophenyl-benzene compound.

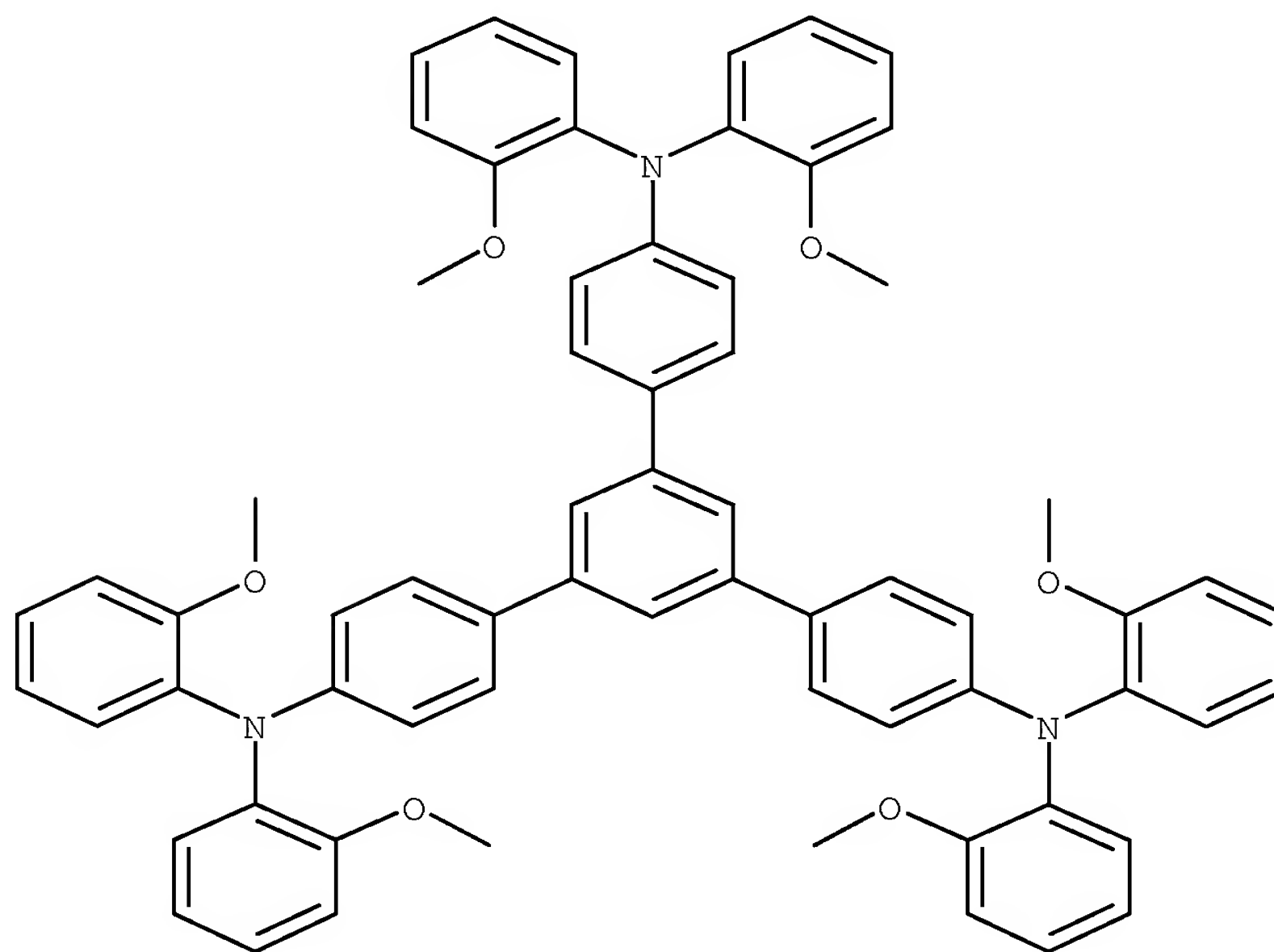
9. (Original) Photovoltaic device according to claim 8, wherein said 1,3,5-tris-aminophenyl-benzene compound represented by formula (I) is selected from the group consisting of:





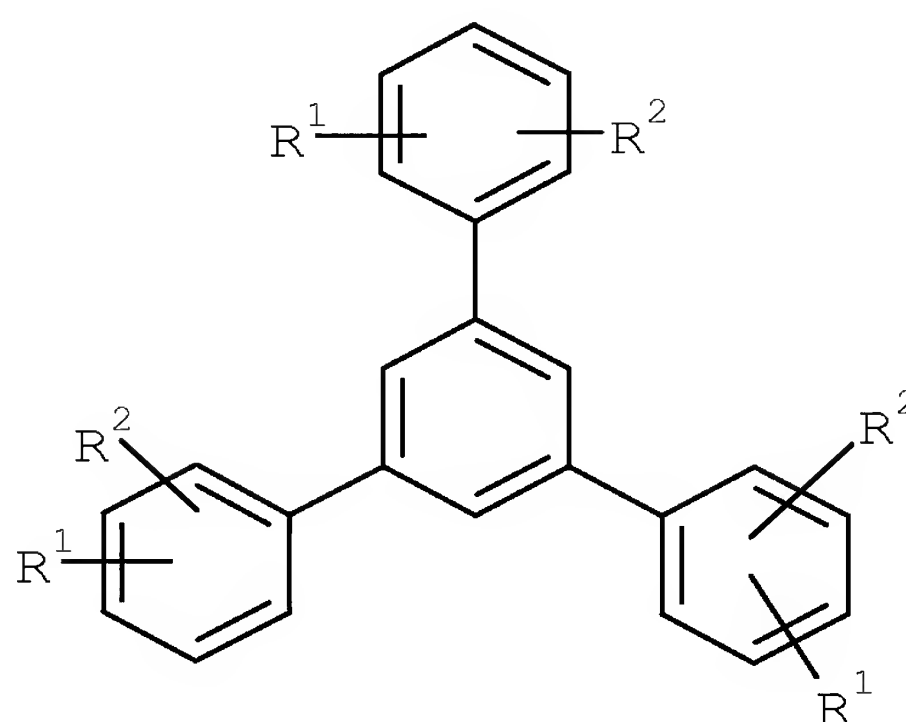


and



10. (Original) Photovoltaic device according to claim 8, wherein said n-type semiconductor is selected from the group consisting of titanium oxides, tin oxides, niobium oxides, tantalum oxides, tungsten oxides and zinc oxides.

11. (Original) Photovoltaic device according to claim 8, wherein said photovoltaic device further contains at least one spectral sensitizer.
12. (Original) Photovoltaic device according to claim 8, wherein said photovoltaic device further contains at least one spectral sensitizer selected from the group consisting of metal chalcogenide nano-particles with a band-gap of less than 2.9 eV, organic dyes and metallo-organic dyes.
13. (Original) Photovoltaic device according to claim 8, wherein said photovoltaic device further contains at least one spectral sensitizer selected from the group consisting metal oxides, metal sulphides and metal selenides.
14. (Original) A process for preparing a photovoltaic device comprising a n-type semiconductor with a band-gap of greater than 2.9 eV and a 1,3,5-tris-aminophenyl-benzene compound represented by formula (I):



wherein R¹ represents a -NR³R⁴ group, wherein R³ and R⁴, same or different, represent an unsubstituted C₂-C₁₀ alkyl group, a substituted C₂-C₁₀ alkyl group, a benzyl group, an unsubstituted cycloalkyl group, a substituted cycloalkyl group, an unsubstituted aryl group or a substituted aryl group, and R² represents hydrogen, an alkyl group including a substituted alkyl group or halogen with at least one transparent electrode comprising the steps of: providing a support with a conductive layer as one electrode; coating said conductive layer on the support with a layer comprising said n-type semiconductor with a bandgap of greater than 2.9 eV; coating said n-type semiconductor-containing layer with a solution or dispersion comprising said 1,3,5-tris-aminophenyl-benzene compound to provide after drying a layer comprising said 1,3,5-tris-aminophenyl-benzene compound; and applying a conductive layer to said layer comprising said 1,3,5-tris-aminophenyl-benzene compound thereby providing a second electrode.